

eccentricity of an elliptic orbit, and that in the case of Jupiter's satellites the outer orbits are highly eccentric, and the inner orbits nearly circular. It may be mentioned that Mercury is an exception to his rule.

Suppose that Laplace had not thought of the possibility of capture. Then Laplace would have been as much entitled to say detachment was the true explanation, because no other was possible, as Dr. See is now entitled to say that capture survives as the only possible explanation. Laplace, of course, would not have reasoned in this way. His theory explains many features of the solar system, in fact so many that when new discoveries showed that his theory was incomplete, there has been a nearly universal reluctance to say that it was altogether wrong. We do not see that Dr. See's hypothesis explains anything. Why, for instance, on the hypothesis of capture are the vast majority of orbits near the plane of the ecliptic and their motion direct?

STATE AID FOR UNIVERSITY EDUCATION.¹

THE grant in aid of university colleges originated in the demand for advanced education in 1889 arising from the university extension movement, and was intended to help university colleges in providing suitable courses. In twenty years conditions have changed, and some of the university colleges have become universities, but they are still claimants for the aid. The members of the University Colleges Advisory Committee had a difficult task before them, and they submitted a report dated July 24, 1908. On this a Treasury minute, June 3, 1909, has been founded which lays down the conditions for participation in the grant. The conditions are summarised thus:—

(1) Any institution to secure a share of the grant must be prepared to afford satisfactory instruction of university standard, which should normally include English, classics, French, German, history, philosophy, mathematics, physics, chemistry, biology.

(2) The courses of instruction must be attended by a reasonable number of students capable of profiting by the education afforded.

(3) The buildings and initial equipment must be adequate for the courses established.

(4) The aggregate income of the institution, whether derived from grants or otherwise, must be sufficient to maintain all the departments in a state of efficiency, and to provide a superannuation scheme.

(5) The grants should be confined to institutions serving great centres of population, and no new institution should be admitted unless it serves a district not already adequately provided with instruction of a university standard.

(6) Due regard must be paid, not only to the standard and the efficiency of the teaching, but also to the spirit animating the institution and its influence as an intellectual centre.

These are the conditions, and it must be agreed that they appear very just, except number five, concerning the admission of new institutions to the privileges, as there may be two or more institutions in a great centre which afford equal or identical advantages, one, however, receiving the grant to the exclusion of the other. This is the case in London, where there are two large institutions fulfilling the conditions, but excluded because certain other colleges are sharing already in the grant. Both Birkbeck College and East London College more than satisfy all the conditions, and there are several other institutions and polytechnics which fulfil, or come very near to fulfilling, the qualifications.

It will naturally be asked why the grant in aid is to be limited to certain favoured institutions in some

centres, and the answer must lie in the miserable inadequacy of the grant. The advisory committee had before them, not the difficulty of the standard of the colleges, but how to make quite too small a meal satisfy the demands of a large, hungry, and rapidly increasing family. In domestic affairs the difficulty has to be met by the father increasing the family allowance, and it would be more logical for Parliament to increase the allowance. The solution of allowing part of the family to starve is indefensible. We have alluded to the condition of affairs in London particularly because London has come off worse in amount than any other city in proportion to its population. London, too, has suffered from want of civic spirit. In the lesser cities strong civic spirit pushes their claims on Parliamentary notice.

It must be noted that the advisory committee is fully alive to the fact that many of the universities and university colleges are drawing grants from several sources, *i.e.* Board of Education, Board of Agriculture, Parliamentary grants, and local rates, and there is danger of their being paid twice over for the same work; but the advisory committee does not suggest at present any way out of this difficulty other than getting a return made to them from each of the granting authorities.

It has been suggested before that all higher institutions should receive their grants from one authority, which should be able to take a survey of the whole kingdom. At present many higher institutions have to depend largely on the local education authority, which secures neither breadth of treatment nor sufficient continuity. The institutions find that there are fat and lean years, and it is not likely that the best educational results will be obtained when there is so much uncertainty. In an article which appeared recently in this journal it was suggested that the control of the higher technical institutions throughout the country should be under a central authority, for prosperity in trade is a national affair, and not local. The same view must be taken in regard to the university colleges and universities. They should be as free from local restraint as possible. This is foreshadowed in the report in the following words:—

We trust, however, that it may be found possible to regard such a scheme as being merely transitional, and to replace it in the near future by one on the more simple lines we have indicated. . . . a scheme that would comprise in a single vote the whole aid granted by Parliament to universities and university colleges for education of university character and standard. The coordination of the institutions which provide higher education in the country in accordance with the principles of administration embodied in the Education Act, 1902, is proceeding apace, and the universities and university colleges have taken the initiative in connecting themselves with the local education authorities most closely related to them by locality and communications. Universities, however, are non-local as well as local institutions, and it is of importance that this two-fold aspect should be appreciated by the central administration, which has to dispense the State subvention for higher education by way of grants to this or that locality, and which must at the same time pay due regard to the interests and necessities of the country as a whole.

NOTES.

THE present summer promises to be one of the coldest on record, but for rainfall it is likely to be several inches short of the measurement in 1903, when at Greenwich the total fall for the three months, June to August, was 16.16 inches. So far, the highest temperature at Greenwich since the commencement of June is 77.7°, on July 18, whilst at the observing station of the Meteorological Office, in St. James's Park, the highest temperature is

¹ University Colleges (Great Britain), Grant in Aid. Parliamentary Paper 182. (London: Wyman and Sons.) Price 1½d.

75°. The Greenwich records only show three days in June with the thermometer above 70°, and the observations since 1841, a period of sixty-eight years, only show one June, 1860, with an equally small number of warm days; but as recently as 1907 June only had five days with the thermometer above 70°. For the first twenty-seven days of July there have been only fifteen days with a temperature above 70°; this is precisely the same number as during the whole month in 1907, whilst in 1879 there were only eight equally warm days, and in 1888 only twelve. In 1907, the summer of which approximates somewhat to that of the present year, there were twenty days in August with a temperature of 70° and above. In 1868, which is about the warmest summer on record, there were in the three months seventy-seven days above 70° and thirty-three days above 80°, whilst in the coldest summer, 1860, there were only twenty-three days with 70° or above, and the sheltered thermometer on no day touched 80°. Taking England as a whole, the temperature this summer has been largely deficient of the average, and the rainfall has been generally in excess, but not to any great extent, whilst the sunshine is everywhere deficient.

M. BLÉRIOT accomplished a flight across the English Channel in his monoplane in the early morning of Sunday, July 25. He started his flight at 4.35 a.m. from Baraques, near Calais, and, having travelled across the Channel, he landed in safety in a field near Dover Castle. According to M. Blériot's own account of the flight, his engine at the time of starting made 1200 revolutions—almost its highest speed—to enable him to get over the telegraph wires along the edge of the cliff, but as soon as this was accomplished the speed was reduced. The monoplane travelled at a height of about 250 feet, and at the time of passing the *Escopette*, the destroyer in attendance, in the Channel the rate of travel was at least 42.5 miles an hour. Twenty minutes after leaving the French coast M. Blériot was able to make out Dover Castle, and, heading the monoplane westward, he followed the coast-line to Dover. Eventually catching sight of his friend, M. Fontaine, waving a large French tricolour to guide him to a suitable place of descent, the monoplane was brought to earth with little damage. The flight represents an achievement of great interest in the history of aerial navigation. On being informed of this notable feat, M. Quinton, president of the Aërial League, remarked, "Before five years are out England will have ceased to be an island. The sea is no longer a barrier. Relations between nations will undergo a change. The strategic and political situation of certain peoples will be transformed." The *Times* gives the following particulars of M. Blériot's monoplane, *Blériot XI*. The area of its sustaining surface, which was at first 14 square yards, was increased last February to 17 square yards. Its spread is 8½ yards. Under these conditions the small monoplane left the ground very easily, but could not stop in the air more than two minutes. Its motor was then replaced by a three-cylinder Anzani of 105 mm. (4.13 inches) bore and of 22-25 horse-power, weighing 132 lb. in working order. With this modification the *Blériot XI* has made some very successful flights, including one on July 4, when the *aéroplane* stopped in the air for 50m. 8s., and another on July 13, when it flew from Étampes to Chevilly, a distance of twenty-six miles. It then went to Calais, where it underwent a few tests, with the present result. The framework of the *Blériot XI* is of ash and poplar stiffened with piano strings. It weighs 45 lb., and is about 23 feet long; it can easily carry a load of 660 lb. placed at its middle point. The landing *châssis*, including the wheels and springs, weighs

only 66 lb. The inclination of the tail of the machine, and the warping of the wings, ensuring lateral stability, are effected by means of a hand-lever, whilst the vertical rudder is moved by a bar pressed down by the foot of the aviator. The propeller, which is a Chauvière one of the type known as "Intégrale," is placed in front of the machine, and is so designed that the air it throws back does not meet the framework of the *aéroplane*. It has a diameter of a little less than 7 feet, and working the *Blériot XI* it has an efficiency of 85 per cent.

THE Civil Service Supplementary Estimates of sums required to be voted for the year ending March 31, 1910, include 6500l. to the Royal Society, as grant in aid of the expenses of the *aéronautical* section of the National Physical Laboratory. The grants under the Irish Universities Act, 1908, amount to 28,150l., namely, Queen's University, Belfast, 4700l.; University College, Dublin, 16,000l.; University College, Cork, 5700l.; and University College, Galway, 1750l.

MR. H. GARRETT, writing from Greensted Rectory by Ongar to the *Times* (July 28), says:—"During the severe thunderstorm on the 13th inst. a meteoric stone fell in the stable yard here with a terrific explosion when within a few feet of the ground, embedding itself in the gravel about 8 inches, the ground around for several feet being perforated with small holes caused by the fragments. The main part and fragments which we could collect weighed 1 lb. 13 oz. The fall was witnessed by my daughters, who were sheltering about eight yards away."

A REUTER message from Melbourne states that it is proposed to invite the British Association to meet in Australia in 1913. The University of Melbourne is communicating with the different Australian universities with the view of formulating definite proposals. It is suggested that the invitation should proceed from the Commonwealth.

THE local secretaries for the forthcoming British Association meeting at Winnipeg desire it to be known that the proposed excursion up the coast of British Columbia to Alaska, now being organised in connection with the Natural History Society of Canada, is unofficial, and is not part of the local committee's arrangements. Those desiring, therefore, to make this journey before the meeting should communicate with Mr. M. B. Cotsworth, Victoria, B.C.

THE death is announced of Prof. G. Arth, professor of industrial chemistry in the University of Nancy. Prof. Arth's first researches were concerned with organic chemistry, his work on menthol and its derivatives being well known. For some years Prof. Arth had been engaged in perfecting methods of metallurgical analysis.

WE notice with regret the death, at Naples, of Dr. V. R. Matteucci, instructor in geology in the University of Naples, and director of the observatory on Vesuvius. It will be remembered that during the eruption of Vesuvius in 1906 Dr. Matteucci followed successfully every phase of the eruption at grave risk to his own safety.

MR. P. W. STUART-MENTEATH desires to direct the attention of our geological readers to the instructive sections to be seen in the neighbourhood of Gavarnie, in the Pyrenean region. The subject has been fully discussed in a paper on the Gavarnie overthrust, and other problems in Pyrenean geology, by Mr. E. E. L. Dixon, with an appendix by Mr. Stuart-Menteath (*Geol. Mag.* for August and September, 1908).

By the will of the late Miss E. S. Wolfe, who died on June 10, leaving estate of the gross value of 71,520*l.*, with net personalty 66,295*l.*, the sum of 1000*l.* is to be given to each of the following societies among other institutions:—the Royal Anthropological Institute, the Royal Archaeological Society, and the Royal Geographical Society. Subject to the payment of duties on the estate, the residue is left to King Edward's Hospital Fund, the Royal Institution, and the Royal Society.

THE National Trust for Places of Historic Interest or Natural Beauty makes an appeal for upwards of 1000*l.* to purchase the central portion of the Cheddar Cliffs with the view of preserving the beauty of that natural monument of scientific interest. There is grave danger that the beauty and grandeur of the gorge may be obliterated before long if the extensive quarrying operations, which have been in progress during the last seven years, are not discontinued. Donations may be sent to the secretary of the trust at 25 Victoria Street, London, S.W.

THE French Association for the Advancement of Science will meet this year at Lille on August 2-7, under the presidency of Prof. Landouzy, dean of the faculty of medicine in the University of Paris. The gold medal of the association, which was instituted last year, is to be awarded to Prof. H. Poincaré, who will deliver a lecture during the course of the meeting. In addition to minor visits to the industries of the neighbourhood, three more extended excursions have been arranged in connection with the meetings. The first of these will be to Douai, where demonstrations by the best-known aviators are to be given; the second excursion will be to the mines of Sessevalle, Aniche, and Gayant, and the third to Gand, Ypres, Bruges, and Furnes. A large number of papers will be read at the meetings, among them being communications from Prof. Poincaré, on integral equations; Prof. A. Gautier, of Paris, on the existence of water vapour in volcanic gases and the origin of thermal springs; Prof. A. Bertillon and Dr. A. Chervin, on metrical anthropology; and Dr. Lewkowitsch, on a new refractometer. The secretary of the association may be addressed at 28 rue Serpente, Paris.

AN important paper on the determination of the bovine or human origin of tuberculosis in the human subject is contributed by MM. A. Calmette and C. Guérin to the current number of the *Comptes rendus* (July 19). They have found that tubercle bacilli of bovine origin can be readily cultivated on a glycerinated ox bile; tubercle bacilli from human beings or birds refuses to grow on this medium, whilst developing readily on human bile or bile from the bird respectively. Another distinction is afforded by the fact that injection of the infected matter into the mammary gland of a goat causes grave mammitis, leading to the death of the animal, if the tubercle bacilli are of bovine origin, whilst cultures of human origin produce a very mild and non-fatal infection. The method has been applied to the diagnosis of a fatal case of acute tuberculosis in a child, aged five months, which had been bottled, and both of whose parents were healthy. The result of applying both the above tests was to show that the tuberculosis was of bovine origin. The authors point out the importance of being able to determine with exactness the relative frequency of tuberculous infections of bovine and human origin.

FIFTY years of Darwinism forms the subject of an article contributed by Dr. W. Breitenbach to Nos. 4 and 5 of *Neue Weltanschauung*.

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A LIST of the birds, by Dr. G. M. Allen, forms the eleventh part of the "Fauna of New England," now in course of issue in Occasional Papers of the Boston Society of Natural History.

THE dragon-flies of the Mississippi valley collected during the pearl-mussel survey of that river in 1907 are catalogued by Mr. C. B. Wilson in No. 1692 of the Proceedings of the U.S. National Museum.

THE fresh-water sponges in the collection of the U.S. National Museum are in course of description in the Proceedings of that institution by Dr. N. Annandale, the first instalment (No. 1690) dealing with those from the Philippines and Australia.

IN vol. v., part vii., of the *Annals of the South African Museum*, Mr. E. Meyrick describes a number of new local Microlepidoptera, while Mr. L. Peringuey discusses new or little-known Hymenoptera of the family Mutilidae from South Africa.

IN the *Irish Naturalist* for July Dr. R. F. Scharff describes and figures a speckled otter from Lough Sheelin, recently acquired by the Dublin Museum. Although albino specimens are known, this appears to be the only speckled otter on record.

IN the July number of the *Entomologist's Monthly Magazine* Mr. G. H. Verrall announces that he is attempting to re-introduce the large copper butterfly (*Chrysophanus dispar*), in the shape of its Continental phase *rutilus*, into Wicken Fen, where he has turned out a number of the larvae.

NEW fishes from Japan and the Liu-kiu Islands are described by Mr. J. O. Snyder in No. 1688 of the U.S. National Museum Proceedings, while two new electric rays from the South Atlantic coast of the United States are named and described by Messrs. Bean and Weed in No. 1694 of the same publication.

WE have recently had occasion to notice several papers on crinoids published by American workers, and we have now to add to the list two by Mr. A. H. Clark, published respectively as Nos. 1691 and 1693 of the U.S. National Museum Proceedings, the first of these dealing with seventeen new species belonging to various genera, while the second is devoted to four new species of *Rhizocrinus*.

THE absence of aquatic forms among the mammals of the Miocene beds of Nebraska has led Dr. F. B. Loomis to the conclusion that these deposits are of aerial rather than lacustrine origin, and this view is confirmed by the study of the tortoises, or turtles, as the author calls them, in American fashion, from the Harrison beds, of which several new species are described by him in the July number of the *American Journal of Science*. All these are land-tortoises of the typical genus *Testudo*.

THE thorax and the articulation of the wings of insects form the subject of an important memoir, by Mr. R. E. Snodgrass, published as No. 1687 of the U.S. National Museum Proceedings. In this paper, which amplifies conclusions reached in earlier communications, the author attempts to show the uniformity of thoracic structure prevailing throughout all orders of insects, and urges that in no case is there evidence that any of the constituent elements of any one thoracic segment have an origin apart from that particular segment. In his study of the wings he adopts the venation-nomenclature proposed by Comstock.

THE determination of the ages of eels inhabiting the fresh-waters of Sweden and the deductions to be drawn

therefrom form the subject of No. 46 of the *Publications de Circonstance* issued at Copenhagen by the Conseil Permanent International pour l'Exploration de la Mer. As the result of these investigations it has been found that the great majority of the five-year-old eels collect at the mouths of the rivers discharging into the Gottland and Botten lakes, where they remain in a barren condition from five to seven years, after which they make their way, as ten- to twelve-year-old fishes, *viâ* the Kattegat, the Skagerack, and the North Sea to the Atlantic for the purpose of spawning.

THE mystery so long shrouding the young of the sanderling has at length been solved, and in the June number of Witherby's *British Birds* Dr. Eagle Clarke gives an excellent coloured plate of four of the long-sought chicks. This brood was discovered by Dr. Bruce on August 3, 1906, in the north-eastern portion of Prince Charles's Foreland, Spitsbergen, and the chicks and their parent are now mounted in the Royal Scottish Museum. Other chicks were subsequently obtained, in 1907 or 1908, by the Danish expedition to N.E. Greenland. In ground-colour the chicks are greyish-buff, variegated with black and deeper buff, and flecked with white, longitudinal stripes being absent. There is a collar of uniform buff on the back of the neck, and the under-parts are nearly white.

THE July number of the *Journal of Economic Biology* is devoted to three papers on injurious insects and their relations. In the first of these Mr. R. S. Bagnall describes certain new British species of thrips (Thysanoptera), with notes on injurious kinds. In the second Mr. H. H. King has notes, with plate, on a boring beetle of the family Buprestidæ, referable to the genus *Sphenoptera*, the larvæ of which are doing considerable damage in the Sudan by attacking the stems of cotton. The third paper, by Messrs. W. E. Collinge and J. W. Shoebottom, is devoted to the description of a new genus and species (*Amerus normani*) of Collembola, based on specimens taken in a greenhouse in the garden of the Rev. Canon Norman at Berkhamstead, Herts. A second species of the group, *Neelus murinus*, typically from Cambridge, Mass., U.S.A., has likewise been taken at Berkhamstead.

THE much-discussed problem of the nature of the "ciliated funnels" of the leeches is dealt with at length, and in a very interesting manner, by Rudolf Loeser in the first part of the ninety-third volume of the *Zeitschrift für wissenschaftliche Zoologie*. The author has investigated these organs in three species of Gnathobdellidæ and four of Rhynchobdellidæ. He concludes that in no case can the ciliated funnels be regarded as nephrostomes, their connection with the nephridium being entirely secondary. They are to be compared with the "ciliated urns" of Gephyreans, and, like the latter, are primarily blood-purifying organs, in the "central mass" of which phagocytosis, and also the formation of new amoebocytes, takes place. In the Glossiphoniidæ the "capsules" are the phagocytic organs, connected with the body-cavity through the funnels, and giving off their products by osmosis to the nephridia. In Herpobdella (*Nephelis*) and in the Hirudinidæ the ciliated organs are the places where blood corpuscles develop, while the excretory products are conveyed to the nephridia through botryoidal vessels. The author has also investigated, by injection methods, the relations of the various blood-containing spaces, and his observations tend to support the conclusions of recent authors, such as Oka, on this subject. He regards it as certain that the lateral blood channels of the Gnathobdellidæ are not true vessels, but merely parts of the body cavity with muscular walls.

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AN illustrated pamphlet of forty-seven pages, describing how Rio de Janeiro has been freed from yellow fever, has reached us; its title is "Comment on assainit un Pays. L'Extinction de la Fièvre jaune a Rio de Janeiro," by Nerêu Rangel Pestana. The pamphlet is issued by La Mission Brésilienne d'Expansion économique, and is published in Paris by MM. Aillaud et Cie. The deaths from yellow fever in Rio de Janeiro were 1078 in 1898, whereas in 1908 there were only four. The sanitary budget has risen from one million to seventeen million francs. Sanitary works on a large scale were carried out, such as port works, capitalisation of marshes, construction of new avenues and roads, with proper alignment through the old unhealthy parts, re-construction of drainage, fumigation of houses, oiling of pools, introduction of pipe water-supply, and so on, and, perhaps as important as anything, a sanitary code, rigorously enforced against obstinacy, ignorance and ridicule, the usual means employed for resisting such measures. As illustrating the activity of the sanitary staff, more than 153,000 breeding-places of mosquitoes were dealt with in 1906. In 1907 the death-rate was 19.2. The general mortality is now no greater than that of Vienna. It must be remembered that occasionally yellow fever disappears quite independently of an attack on the mosquito, but it can hardly be doubted that these splendid triumphs of tropical medicine in Rio de Janeiro, in Santos, and in other places have been entirely due to the war without mercy waged against *Stegomyia fasciata*, and that soon yellow fever will be a disease of the past.

AN account of the American mistletoe, *Phoradendron flavescens*, dealing with the anatomy and some of its biological aspects as a hemiparasite, is presented by Mr. H. H. York in Bulletin No. 120 of the University of Texas. Dissemination is attributed to the agency of birds that eat the seeds. The commonest host plants are hackberry, mesquite, elm, and osage orange. The seedling first forms an attachment disc on the outside of the host, then sends in a primary haustorium which spreads in the cortex; from the haustorium sinkers are developed, which penetrate the wood along the medullary rays. The growth of the parasite is very slow, but it may attain a length of 3 feet in about twenty years. The host plants become misshapen, but are not seriously injured, unless indirectly by wood-boring insects, which first attack the mistletoe.

THE expectation that many striking new plants would be discovered in the collection made by Mr. E. Ule in the State of Bahia is fully borne out by the first list of diagnoses published in Engler's *Botanische Jahrbücher* (vol. xlii., part ii.). Two xerophytic bromeliads from the mountains furnish the types of new genera, *Sincoræa* and *Cryptanthopsis*, allied to *Fascicularia* and *Cryptanthus*; new species, chiefly rock-inhabiting, are added to *Encholirion*, *Hohenbergia*, and other genera. Two root-climbing parasites are additions to the genus *Struthanthus*, and a new bushy *Phoradendron* was taken on a *Cæsalpinia*. Dr. H. Harms, one of the collaborators with Mr. Ule, describes a number of new species for the Leguminosæ, notably species of *Calliandra*, *Mimosa*, and *Cassia*. Under *Euphorbiaceæ*, new species of *Euphorbia*, *Jatropha*, and *Manihot* are recorded, and Dr. I. Urban distinguishes a new species of *Loasa*.

A HIGHLY interesting number of the Proceedings of the Boston Society of Natural History (vol. xxxiv., No. 7) is devoted to the flora of the islands of Margarita and Coche, lying off the mainland of Venezuela. The author, Mr. J. R. Johnston, has twice visited the islands, and has

made a close study of the flora of Venezuela. The list comprises about 650 species, of which two-thirds are common to tropical America, thirty-seven are west Indian, and eighty-two are confined to South America, of which one-half are endemic. The Leguminosæ is the predominant family, and supplies many of the common plants, such as species of *Cæsalpinia*, *Cassia*, and *Calliandra*. The family of *Cactaceæ* is individually, although not specifically, well represented, and the species of *Bromeliaceæ* are conspicuous on account of their striking colours and appearance. The paucity of species in comparison with the number of genera is marked, the proportion being 1.6 to 1; the specifically largest genus is *Croton*, with eleven species; *Capparis* provides nine species.

MESSRS. BAUSCH AND LOMB, Thavies Inn, the makers of the high-class Minot microtomes, have issued a new catalogue of their various patterns to indicate recent improvements. Additional features are noted for the well-known Minot automatic rotary microtome; the knife can be moved to and fro, from side to side, or can be rotated, owing to its insertion in a special knife block; split nuts with releasing lever allow of rapid adjustment, and the feed wheel is provided with a guard. The new model Minot automatic precision microtome, a powerful and rigid type designed for heavy work, although equally efficient for light cutting, has been re-modelled; the gearing between fly-wheel and crank produces an exceptionally smooth feed. A freezing microtome for fixing on the nozzle of a cylinder containing carbon dioxide is a new instrument, intended to provide surgeons with an apparatus for preparing sections that can be examined on the spot.

WE have received the *Studi e ricerche di chimica agraria* for the years 1906-8 from the agricultural chemistry laboratory of the University of Pisa. The volume includes a paper by the director, Prof. Italo Giglioli, on the stimulus to plant growth occasioned by small quantities of manganese salts, &c., and studies by A. Quartaroli on certain properties of phosphates of agricultural interest.

A SUBJECT of great practical importance and scientific interest is discussed in a recent issue of the *Cairo Scientific Journal* (No. 29). For the past twelve years there has been a steady fall in the average yield of Egyptian cotton per feddan, and the loss now amounts to five pounds per feddan per annum at current prices. The late Mr. Gibson, in 1906, attributed the loss to the rise in level of the subsoil water, which is a direct consequence of the canal system now being introduced. One case was noted on the State Domains where a high-level canal raised the water-table of the adjoining land by seepage from a depth of 3 metres to 1½ metres, and the yield of cotton fell off considerably. The remedy appears to lie in a great extension of the drainage system.

ATTENTION has recently been directed in the pages of the *North British Agriculturalist* to the use of soya beans as cattle food. The bean is well known in America and in Asia, but has hitherto not been used in the British Isles. After removing some of the oil, the residue is made into oil-cake containing about 7 per cent. of oil and 40 per cent. of "albuminoids" (i.e. 6.4 per cent. of nitrogen, albuminoid being defined as nitrogen $\times 6.25$), and is at present cheaper than other foods of like composition. During the spring of this year about 50,000 tons of beans have been imported, it is understood, from Manchuria, and at present prices the cake promises to form a very useful addition to the list of cattle foods.

MR. E. S. THOMAS contributes to the May number of the *Journal of the Cairo Scientific Society* a useful article

summarising the facts of the early mining industries of Egypt. The gold of the desert has been worked from a very early period, an ingot having been found buried with a corpse of the first dynasty, while gold-handled flint knives and stone jars, the mouths of which are ornamented with gold, testify to the artistic skill of the people of the same period. The earliest direct references to expeditions in search of gold date from the twelfth dynasty. Western Asia drew large supplies of gold from Egypt during the period represented by the Tel-el-Amarna letters, and the records of tribute paid in the precious metal by subject races show that immense treasures were at the disposal of the Pharaohs. Silver was also received in large quantities from Crete, Attica, and probably from Cilicia. The first systematic scheme for gold-mining under Egyptian management dates from the nineteenth dynasty, and it continued to be carried on until it became impossible to protect the workers from Bedouin marauders. Large workings in the quartz reefs at Um Rus and Haimur show the vast extent of these operations. Altogether about ninety old workings in search of gold have up to the present been identified in the eastern Egyptian desert, and twenty more known to exist remain to be traced. Exclusive of workings in the Sudan proper, all these lie between lat. 22° and 28°, that is, between Minia and the Sudan border, and east of long. 33°. Many others will probably be discovered in the more remote desert area.

THE Director-General of Indian Observatories has issued a memorandum (dated June 8) on the meteorological conditions prevailing before the south-west monsoon of 1909. Past experience shows that the most important indications regarding monsoon rainfall are afforded by the pressure conditions in South America and the Indian Ocean, and these for the past two months have been decidedly favourable, being above the normal in the former and below in the latter regions. Late and excessive snowfall is unfavourable to the monsoon, especially in north-west India, but since April none of any significance has occurred. From these and other data referred to in the memorandum Dr. Walker draws the following useful inferences:—(a) the general conditions are such as have, in a decided majority of years, been followed by a total monsoon rainfall of more than the average amount; (b) the indications regarding the geographical distribution are by no means well marked, but suggest that the outlook for the plains of north-west India during the earlier part of the season is somewhat less favourable than that for the field of the Bay current.

ALTHOUGH much work has been done on the relation between the magnetic qualities of steels and their composition, we are still far from being in a position to state what it is exactly which confers on a steel the property of magnetic permanence. The most recent work in this field is that of Mr. T. Swinden, described in the June number of the *Journal of the Institution of Electrical Engineers*. Mr. Swinden, after examining a number of steels containing 3 per cent. tungsten both magnetically and microscopically, comes to the conclusion that magnetic permanence depends more on the constitution than on the state of crystallisation of the steel.

THE July number of the *Journal de Physique* contains Dr. Hale's address to the Société française de Physique on the magnetic fields of sun-spots. By means of a very careful and detailed comparison of the intensities and polarisations of the doublets and triplets obtained in the Zeeman experiment in the laboratory with the corresponding effects obtained in the spectra of sun-spots by the

help of the Snow telescope at Mount Wilson, California, at an altitude of 1700 metres, Dr. Hale shows that sun-spots consist of columns of ionised vapours circulating in opposite directions in the two solar hemispheres, the axis of rotation being, in general, inclined at a considerable angle to the normal to the solar surface. There appears to be evidence of connection beneath the solar surface of the vortices observed north of the solar equator with those south of that line. The whole of the observations afford strong support to the theory that sun-spots are the normal products of the convection currents which occur in the sun.

THE *Bulletin international* for 1907 of the Bohemian society, L'Académie des Sciences de l'Empereur François Joseph I., was published in 1908, and a copy has just reached us. Drs. B. Kučera and B. Masek write in English on the radiation of radio-tellurium, and continue a description of their researches, which have led them to the following conclusions among others. The absorption of the α rays from radio-tellurium in metals and gases investigated by Bragg's method is manifested similarly as with α rays of radium and its first transformation products by lowering of the ionisation curve. The atomic stopping power is very nearly proportional to the square root of the atomic weight, and possesses almost the same values as Bragg found for radium C. It is probable, though, that the proportionality constant increases slightly with atomic weight. For the same gas (air) the ranges corresponding to the α rays of the same velocity are inversely proportional to the pressure (density) of the gas. The ranges for the rays of the same velocity in different gases (air, oxygen, carbon dioxide) are inversely proportional to the mean square roots of their atomic weights. The existence of a secondary radiation of α rays which ionises air at ordinary pressure cannot be taken as ascertained.

FROM the account, published in *Engineering* for July 16, of the trials conducted recently by the Scottish Automobile Club, it is evident that electric ignition can be made perfectly trustworthy if well carried out. Fifty-eight cars were fitted with high-tension magnets, four used accumulators only, and three low-tension magnets. Only one car fitted with high-tension magnets had any stops at all, except for cleaning or changing sparking-plugs, a matter which often depends more on the lubrication than on the ignition apparatus. Of the other systems, there was only one small stoppage in any of the cars having accumulator ignition, and two considerable stops in cars fitted with low-tension magnets. The Albion car, fitted with low-tension magnets, went through without an ignition stop, as it has done on previous occasions, and it may be taken for granted that the low-tension system, like the high-tension, can give completely satisfactory results.

OUR ASTRONOMICAL COLUMN.

ASTRONOMICAL OCCURRENCES IN AUGUST:—

- Aug. 3. 23h. Mercury in superior conjunction with the Sun.
- 5. 4h. 15m. Mars in conjunction with the Moon (Mars $0^{\circ} 13' S.$).
- „ 23h. Saturn stationary.
- 6. 9h. 45m. Saturn in conjunction with the Moon (Saturn $1^{\circ} 32' N.$).
- 10-12. Perseid maximum.
- 11. 19h. 2m. Venus in conjunction with Jupiter (Venus $0^{\circ} 12' N.$).
- 13. 8h. Mars in perihelion.
- 17. 11h. 36m. Jupiter in conjunction with the Moon (Jupiter $4^{\circ} 17' S.$).
- 18. oh. 13m. Venus in conjunction with the Moon (Venus $4^{\circ} 15' S.$).
- 23. 3h. Mars stationary.

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A LARGE GROUP OF SUN-SPOTS.—During the past week a group of sun-spots, of abnormal size for this period of the sun-spot cycle, has been visible on the solar disc—even to the naked eye. This large group has developed from a few scattered, small nuclei which came round the eastern limb on July 18, and now includes a leading spot of large dimensions and two separate trails of smaller spots. In addition to the large group there was another, preceding, group of medium size and two smaller ones to be seen on the disc on Saturday last. This outburst still further emphasises the extension, in time, of the sun-spot maximum of 1905-6.

PHYSICAL INTERPRETATION OF LUNAR FEATURES.—In presenting the eleventh fascicle of his photographic map of the moon, M. Puiseux placed before the Paris Academy of Sciences some ideas as to the nature and history of the lunar landscape, suggested by the study of the photographs. From the absence of any appearance of division into parallels of the dark and light areas, M. Puiseux argues that the moon certainly has not polar regions of ice and snow such as those seen on the earth and Mars. Then, considering the probable presence or absence of water, it follows that the moon's surface must either be glaciated completely or shows no trace of water areas.

Against the former suggestion, which, it will be remembered, is the one upheld by Herr Fauth, the noted selenologist, there is the relatively low albedo, comparable to that of the terrestrial volcanic and siliceous rocks, but certainly much less than that of snow or ice, and there is also the fact that extremely bright and extremely dark areas are mixed up indiscriminately in small areas. M. Puiseux promises a further communication dealing with the subject of the form and distribution of the dark lunar spots seen on the same photographs (*Comptes rendus*, No. 26).

DOUBLE-STAR MEASURES.—No. 158 of the Lick Observatory Bulletin contains the fourteenth list of double stars discovered and measured by Prof. R. G. Aitken with the 36-inch refractor of the Lick Observatory. All the pairs measured are separated by distances of less than $5''$, and in eighty-two cases less than $2''$. The present publication contains the measures of 100 double stars, and brings the total number discovered by Prof. Aitken to 2000, 74 per cent. of which are separated by distances of less than $2''$.

A discussion of the available data of 7500 known pairs leads Prof. Aitken to the conclusion that, among the stars down to the ninth magnitude, the number of doubles having separations of less than $2''$ is greater than those separated by distances exceeding $2''$, but less than $5''$, in the proportion of $3/1$. Hence follows a strong confirmation of the probability that practically all the closer doubles are in reality binary systems, not merely optical pairs.

No. 4338 of the *Astronomische Nachrichten* contains the measures of a number of double stars made by Mr. E. D. Roe, jun., with the 6½-inch refractor of his observatory at Syracuse.

MAXIMUM OF MIRA IN 1908.—Observations of the brightness of α Ceti were made by M. Luizet, at St. Genis-Laval, between September 18 and November 28, 1908, and show that the maximum brightness, 3.6 mag., occurred on October 12; this agrees within one day with the epoch given in the *Annuaire du Bureau des Longitudes* (*Astronomische Nachrichten*, No. 4340, p. 332, July 16).

OBSERVATIONS OF JUPITER'S FIFTH SATELLITE.—Although finding it a difficult object to measure, Prof. Barnard succeeded in obtaining measures of Jupiter's fifth satellite during 1908 and 1909 sufficient to determine the times of, and distances at, elongation, and to give a new value of the satellite's period. Western elongations took place at 1909 February 21 14h. 25.4m. (central standard time) and 1909 March 14 12h. 29.6m., and the apparent distances were $56.47''$ and $56.00''$ respectively; taking $\Delta = 5.20$, the latter become $48.08''$ and $47.93''$. Combining these values with those determined in 1892, the period becomes 0.49817906d., which agrees within one-thousandth of a second of time with that previously determined. It therefore appears that the period is now quite accurately known, and has suffered no sensible change during the seventeen years that the satellite has been under observation (*Astronomische Nachrichten*, No. 4339).